Interaction Effect of Animation Teaching Strategy on Students' Achievement in Climate Change

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Abstract

This study investigated the interaction effect of animation teaching strategy on secondary school students' achievement in climate change. Three objectives, research questions and hypotheses each, made up the study. The research design used was a quasi-experimental design, which involves two groups, the experimental (Animation), and the control (Conventional) group. The population of the study comprised of the entire SS3 science students in North Central Nigeria. Intact classes of eighty (151) SS3 science students offering Geography in Senior Secondary Schools made up the sample size for the study. Purposive sampling technique was used to select two schools for the study from two States (Benue and Niger). The purposive sampling technique was appropriate for the study because it encourages subjective selection. Both descriptive and inferential statistics of means ($\bar{x}$) and standard deviations was used to answer the three research questions. Analysis of Covariance (ANCOVA) was used to analyze the research hypotheses at a significant p-value of 0.05 (5%) confidence level. The findings of this study confirmed that animation teaching strategy (ATS) is effective in enhancing secondary school students' achievement in climate change. Based on the findings, it was recommended among others that Animation teaching strategy should be adopted in teaching and learning of climate change and other environmental education related concepts in Nigerian secondary schools.

Keywords: Interaction effect, animation teaching strategy, secondary school, students' achievement, climate change

Introduction

Climate change is the alteration of the average atmospheric whether condition which is fairly stable and predictable. However, the supposed natural event has been exacerbated by human-induced anthropogenic activities such as deforestation, unsustainable agricultural practices, emission of greenhouse gases which include Methane, Nitrous oxide, Chlorofluorocarbons (CFCs), Carbon Dioxide (CO_2) that constitute about 70% of these noxious gases, among others. These gases have been reported as contributing factors to variety of natural disasters such as extreme heat, flooding, bushfire, and drought (Olatunde-Aiyedun, 2021).

In other to reduce the intensive global impact of climate change on the environment, the United States of America re-joins the Paris Agreement on 19th February, 2021 which focuses on Climate Action through mitigation, adaptation, and finance, signed in 2016. Specifically, Paris Agreement aims to decarbonize the earth by keeping global temperatures "well below" 2^0C which has an average temperature of 15.5^0C of $1.0\text{-}1.1^0C$ above pre-industrial level as at June, 2021; to limit the amount of greenhouse gases emitted by human activity; and for rich countries to help poorer nations by providing "climate finance" to adapt to climate change and switch to renewable energy (Briggs, 2021).

Nigeria, as a member of the Paris Club Agreement, also experiences adverse climate conditions with negative impacts on the welfare of millions of her citizens. Persistent droughts and flooding, off season rains and dry spells have sent growing seasons out of orbit, on a country dependent on a rain fed agriculture. Alarm bells are ringing with lakes drying up and a reduction in river flow in

the arid and semi-arid region. Developing countries like Nigeria are least prepared for the impact of global warming. Global warming is real and evidence abounds in the country. Although the country has been lucky not to have experienced major climate-change-induced natural disasters, the effect of climate change is evidenced by rise in sea level and erosion along the nation's coastline; the weather pattern is no longer distinct in the country with extreme hot weather conditions and high precipitations leading to flooding which ruined crops in parts of the country creating food scarcity, loss of properties and lives (Olaniyi, Funmilayo & Olutimehin, 2014).

Climate change has been considered as one of the major global crisis in the 21st century. For this reason, the United Nation Member States adopted the 2030 agenda for Sustainable Development Goals (SDGs) at the sustainable development summit on 25th September 2015, which incorporated sets of 17 sustainable goals that emphasizes three major global problems in the world, namely: poverty, inequality and climate change (Ishaya, 2017; Ekpo & Aiyedun, 2018).

In other to tackle this global environmental concern, the United Nations Development Programme's (UNDP, 2010) reported that measures are needed in creating environmental educational awareness on climate change. It was therefore suggested that the subtopics of this awareness creation should include the following: causes, effect, consequences, and safety measures to prevent the problems.

Olorunfemi (2010) asserted that the most significant obstacle to reducing the impact of climate change in Nigeria is the lack of awareness and knowledge of climate change. Onojerena and Ogedegbe (2016) therefore suggested that awareness of climate change through quality education and practical training is necessary, particularly in areas prone to frequent climate change disaster such as States that harbours major rivers in Nigeria (Kogi, Benue and Niger State).

Therefore, the impact of climate change could be minimized if individuals are enlightened about it. Wunderlich (2013) stated that climate change awareness should start from school. Education has been recognized as a fundamental process for fostering economic and social development. To this end, therefore, education is generally acknowledged as a critical engine that drives the other Sustainable Development Goals (SDGs) which are set to be achieved by year 2030 (UNDP, 2017). Furthermore, Secondary school plays a vital role in providing suitable preparation in the academic achievement and retention as well as inculcating optimistic attitude to students' learning of science concepts such as climate change (Katcha & Ndagi, 2012; Olatunde-Aiyedun, 2021).

However, the teaching method popularly used in the Nigerian secondary schools is the conventional teaching method (Olatunde-Aiyedun & Ogunode, 2021). This teaching method gives a complete autonomy to the teacher while the student takes on a passive role which hinders effective learning and students' opportunity to visualize learning content (Olatunde-Aiyedun, Ogunode & Eyiolorunse-Aiyedun, 2021). However, the conventional teaching method has not been totally condemned. The Federal Republic of Nigeria (2014) stated in its National Policy on Education that in order to fully realize the goals of education in Nigeria and gain from its contribution to the national economy, government should take necessary measures to ensure that teaching is practical, activity-based, experiential, and Information Technology (IT) supported (Aiyedun & Ogunode, 2020). Gone are the days when teaching and learning is only based on chalk and books packed somewhere called library; in today's world, digitalization is encouraged to retrieve, store and transmit information especially after the covid-19 lockdown (**Ojelade, Aregbesola, Ekele & Aiyedun, 2020**).

For the past two decades, the most prominent feature of the technology-based learning environment has become animation (Aina, 2013; Musa, Ziatdinov, Sozcu & Griffiths, 2015; Aiyedun, 2020).

Utilization of animations has been firmly emphasized as a creative production of meaningful learning and students-centred alternative to the traditional learning approaches in many countries. Animation is much better at representing ideas which involve a video presentation of moving objects from graphical materials that include 3D photographs and maps (Ekpo & Aiyedun, 2020). Animation supports creative thinking, therefore concretizing abstract temporal ideas (Rias & Zaman, 2011; Aiyedun, 2020). Iravani and Delfechresh (2011) stressed that the flexibility of learning through animation allows a wider range of stimuli thus ought to increase the students' attitude in learning which consequently translates into an increase in the level of students' academic achievement and retention which is the priority of any educational system.

Animation teaching strategy is a video presentation comprising of motion graphics, audio-virtual, content translation into words for effective and meaningful learning. The view expressed by Bada, Adekomi and Ojo (2012) was such that, animation teaching strategy provides additional information and give external support for mental simulations thereby allowing the learner to perform a higher amount of cognitive processing. Classroom best practices in science concepts should be subjected to visualization of subject matter which are better processed in cognitive structure. Therefore, with animation teaching strategy, students could have well processed information in the cognitive structure (Katcha, 2010). Generally, animation teaching strategy is useful in facilitating teaching and learning of science.

Science has become an integral part of life and in the educational system. Learning of science has become unavoidable part of general education. Science is an important subject in school curriculum because man's future depends to a large extent on scientific adventures and development of productive activity. Hence there is a great need to teach science in school curriculum. Science Education is the acquisition of both scientific knowledge and education as well as inculcating the professional skills to be able to share this scientific knowledge with individual or community who are not traditionally in science. Better still, Science Education is the study of biology, chemistry or physics with effective method of teaching in other to be able to impart scientific knowledge to any individuals or community (Olatunde-Aiyedun & Ogunode, 2021). The moment methodology is excluded from learning of concepts, it is no longer Science Education but only science. Science Education should be able to teach science concepts and also address learners' misconceptions about these science concepts (Aina, 2013).

Asides the basic science subjects, Geography is the study of science concepts (such as climate change) that relates the differences between the natural systems, cultural (human) activities and the interdependencies of all these over space. It relates to sciences due to its capability to draw knowledge from the natural environment (Ekpo & Aiyedun, 2019). That is, the knowledge of Geography is not only relevant and useful to the learners in the classroom, but to all humans who have to live with the dynamic realities of contemporary times (Akintade, 2011). Nevertheless, the main rationale for including Geography Education in the secondary school curriculum was premised on the relevance of the subject to the process of equipping students with the necessary knowledge that is needed to understand both natural and human phenomena (which are both scientific) within the immediate environment and beyond . Substantiating the foregoing, Orji and Uka (2012) noted that Geography is found under both core and non-vocational electives categories in the Senior Secondary curriculum in Nigeria. In this sense, therefore, it is conceivable that secondary school students in Nigeria are expected to offer Geography either as a core or as an elective subject during the three-year period of senior secondary education.

Despite all the efforts by stakeholders such as students, teachers, parents, governments and the general public, students' academic achievement is still below expectation (Katcha & Mukaddas,

2021). There is an imbalance between efforts and the knowledge required for science students, particularly those offering geography to manifest academic excellence in achievement, retention and attitude towards their learning.

Gender disparities have been noticed and reported by various researches as concerning poor academic achievement, retention and attitude in Science Education as well as in Geography (. Udousoro (2011) stated that male in secondary schools are more likely to take difficult subjects areas and challenging problem-solving situations, while females will prefer simple subjects and less difficult tasks easy problem-solving situations. Omajuwa (2011) stated on the contrary that gender has no influence on students' academic achievement in schools.

Therefore, the present study intends to investigate the argument of gender gaps towards students' achievement, retention and attitude to climate change when exposed to animation teaching strategy than those exposed to the conventional teaching method in Kogi State, Nigeria.

Statement of the Problem

The paradigm shifts in teaching and learning of climate change deemphasized the use of conventional teaching method because it encouraged memorization of concept without actually exposing students to challenges that will make them to participate actively in the learning process. The poor academic achievement to learning among students at senior secondary schools level is of significant concern to stakeholders in education. Dajal and Mohammed (2019) stated that most of the time the poor academic achievement of students to climate change can be attributed to many factors, of which using the appropriate teaching strategy is mostly paramount.

There has been consistent poor academic achievements among senior secondary school students in Nigeria (Aina & Olanipekun, 2014; Olatunde-Aiyedun, 2021). The general consensus is that conventional teaching methods may have only encouraged rote learning of facts and concepts, making the subject uninteresting and difficult to students, thereby affecting the attitude of students to learning climate change as well as resulting invariably in poor students' achievement and retention.

The Joint Admission and Matriculation Board (JAMB) Registrar Prof. Ishaq Oloyede, stated that out of over 1.3 million candidates that registered for the JAMB examination in Nigeria which began on June 19 and ended on July 3, 2021 in over 700 accredited Computer Based Test (CBT) centres nationwide, only about 803 students (0.06%) had 300 scores and above out of 400 overall scores, unlike in June, 2019 to 2020, about 0.16% and 0.26% respectively. While in 2021, 99.65% with a drop of 0.25% from the previous year. The registrar added that those who scored 160 and above in 2020 were 69.89%, while in 2021 was 45.62% (Edokwe, 2021). This means that 2020 had a better result than 2021 even despite the severe impact of the covid-19 on the global social, political, and economical environment, as well as the major impact on education, which was the school closure. In other words, this could mean that the problem has been on before the coronavirus pandemic which must be tackled in order to achieve meaningful result.

Purpose of the Study

The main purpose of this study is to investigate the interaction effect of animation teaching strategy on secondary school students' achievement in climate change in North Central Nigeria. Specifically, the objectives of the study are to investigate:

i.   the effect of animation teaching strategy on secondary school students' achievement in climate change in North Central Nigeria;

ii.   the effect of animation teaching strategy on secondary school students' achievement in climate change on the bases of gender;

iii.   the interaction effect of animation teaching strategy and gender on students' mean achievement scores in climate change;

Research Questions

The research will be guided by the following research questions:

1   What is the effect of animation teaching strategy on secondary school students' achievement in climate change in North Central Nigeria?

2   What is the effect of animation teaching strategy on secondary school students' achievement in climate change on the bases of gender?

3   What is the interaction effect of animation teaching strategy and gender on students' mean achievement scores in climate change?

Hypotheses

The following null hypotheses are formulated for testing at 0.05 level of significance.

Ho1.   There is no significant difference in the mean achievement scores of students taught with animation teaching strategy (ATS) and those taught with conventional teaching method (CTM).

Ho2.   There is no significant difference in the mean achievement scores of male and female students taught with animation strategy.

Ho3.   There is no interaction effect of animation teaching strategy and gender on students' mean achievement scores in climate change.

Methodology

The study adopted a non-randomized pre-test post-test quasi-experimental design. In the study, there were two groups (experimental and control). Independent variables in the study are the method of instruction with two (2) levels: Animation Teaching Strategy (ATS) and Conventional Teaching Method (CTM). Animation (treatment) serves as the independent variable was used as a teaching strategy for the experimental group, while the conventional teaching method was used for the control group. Gender factor was used to serve as the intervening/Moderator variables (male and female). The population of the study comprised of the entire SS3 science students in North Central Nigeria. Intact classes of eighty (151) SS3 science students offering Geography in Senior Secondary Schools made up the sample size for the study. Purposive sampling technique was used to select two schools for the study from two States (Benue and Niger). The purposive sampling technique was appropriate for the study because it encourages subjective selection. The schools were selected based on the following: the researcher's judgment in the availability and accessibility of the facilities needed for the study; years of existence for more than ten years; gender composition (co-educational schools) in order to take care of the gender issues; and most importantly, because the sample size only represent a cross-section of the population. In other words, the schools are found to have 70 and 81 science students offering geography in SS3 since it is an elective subject. The experimental group was made up of 29 male and 41 female students, while the control group consisted 38 male and 43 female students. The instrument used was a Climate Change Achievement Test (CCAT) which was a two-part researcher-designed instrument. Part A will comprise of students' demographic data and Part B will contain thirty two (30) multiple choice objective items on climate change selected from past SSCE questions in Environmental

Education curriculum infused in subjects such as Biology, Chemistry, Agricultural Science, and Geography. The items in the test covered all the areas taught to the two groups. Each question consisted of four options (A, B, C, and D) which are; one correct answer and three distractions. The SS3 Geography curriculum served as a guide for developing the questions. In other to establish the reliability of CCAT instrument, a pilot test was carried out on SS 3 science students offering geography in Kogi State which was a different State in the North Central region of Nigeria, from where the main work was conducted. The school used was comparable in terms of teachers' qualities and strength, infrastructure, learning environment, population and administrative competence to the ones that will be used for the final study. The pilot test enabled the researcher to determine the clarity of the wordings, readability of the items, appropriateness and adequacy in terms of content coverage as well as determined the actual time for the test (which was treatment time/the teaching duration). Data from a 30-item CCAT was established using Pearson Product Moment Correlation Analysis (PPMCA) on the Statistical Package for Social Science (SPSS) software version 23. The reliability correlation coefficient of 0.85 index was obtained. Both descriptive and inferential statistics of means ($\overline{x}$) and standard deviations was used to answer the three research questions. Analysis of Covariance (ANCOVA) was used to analyze the research hypotheses at a significant p-value of 0.05 (5%) confidence level. The data collected comprised of the pre-test and post-test scores of SS3 students which were collated, coded and analysed using Statistical Package for Social Sciences (SPSS). Analysis of Covariance (ANCOVA) was considered appropriate because it helped to analyse the three variables in the study.

Data Presentation

Demographic Data
The following Tables 1 and 2 indicate the percentages and number of respondents by groups and gender.

Table 1: Distribution of Respondents by Groups

Groups	Number of Respondents	Percentage
Experimental	70	49
Control	81	51
Total	151	100

Source: Research Survey, 2021

Table 1 showed that one hundred and seven respondents representing 49% were in the experimental group while one hundred and three respondents representing 51% of the sample were in the control group. The total sample of the study was two hundred and ten. Results of these analyses showed that respondents in the control group were in the majority.

Table 2: Distribution of Respondents by Gender

Groups	Gender	Number of Students	Percentage
Male	Experimental	29	19.21
	Control	38	25.17
			44.38%
Female	Experimental	41	27.15
	Control	43	28.48
			55.63%
Total	**151**		**100%**

Source: Research Survey, 2021

Table 2 showed the total respondents for the experimental and the control group on gender to be one hundred and fifty one (151) respondents representing 44.38% male students while 55.63% represents female respondents. Results of these analyses showed that female respondents were in the majority.

Data Analysis and Interpretation of Results

Research Question 1. What is the effect of animation teaching strategy on secondary school students' achievement in climate change in North Central Nigeria?

Table 3: Summary of Pretest, Post-test mean and Standard Deviation of Climate Change Achievement Test (CCAT)

Variable		Pretest		Posttest		Mean gained
Group	**N**	**Mean**	**SD**	**Mean**	**SD**	
Control	81	38.53	15.28	40.53	14.89	2.00
Experimental	70	67.48	19.70	73.57	14.02	6.09
Mean Difference		**28.95**		**33.04**		

Source: Research Survey, 2021

Table 3 shows the pretest mean, posttest mean and standard deviations for the experimental and control groups. The pretest mean scores were 38.53 and 67.48 for the control and experimental group respectively with mean difference of 28.95. While after the treatment, post test scores was 40.53 for control and 73.57 for the experimental group with mean difference of 33.04 in favour of the experimental group. This implies that the students exposed to Animation teaching strategy (ATS) had more improvement in their academic achievement than their counterparts. However, the posttest mean scores of both groups show that both groups improved on their mean scores after the treatment.

Research Question 4: What is the effect of animation teaching strategy on secondary school students' achievement in climate change on the bases of gender?

Table 4: CCAT Mean Difference and Standard Deviation of Male and Female Students Taught Climate Change using ATS

Group	Sex	N	Pretest	Posttest	SD	Mean gained
Experimental	Male	33	38.53	67.48	19.70	**28.95**
	Female	37	40.53	73.57	14.02	**33.04**
	Mean Difference					**6.09**

Table 4 shows the mean and standard deviation of Climate Change Achievement Test scores of male and female students in the experimental group. The female had 73.57 mean score as against 67.48 for the male, with standard deviation of 14.02 and 19.70 respectively. This shows that the male students had less variation (mean gained). The difference in the mean achievement scores of both male and female students taught climate change using AST is 6.09.

Research Question 5: What is the interaction effect of animation teaching strategy and gender on mean achievement scores in climate change on the bases of gender?

Figure 1: Interaction effect of animation teaching strategy and gender on mean achievement scores
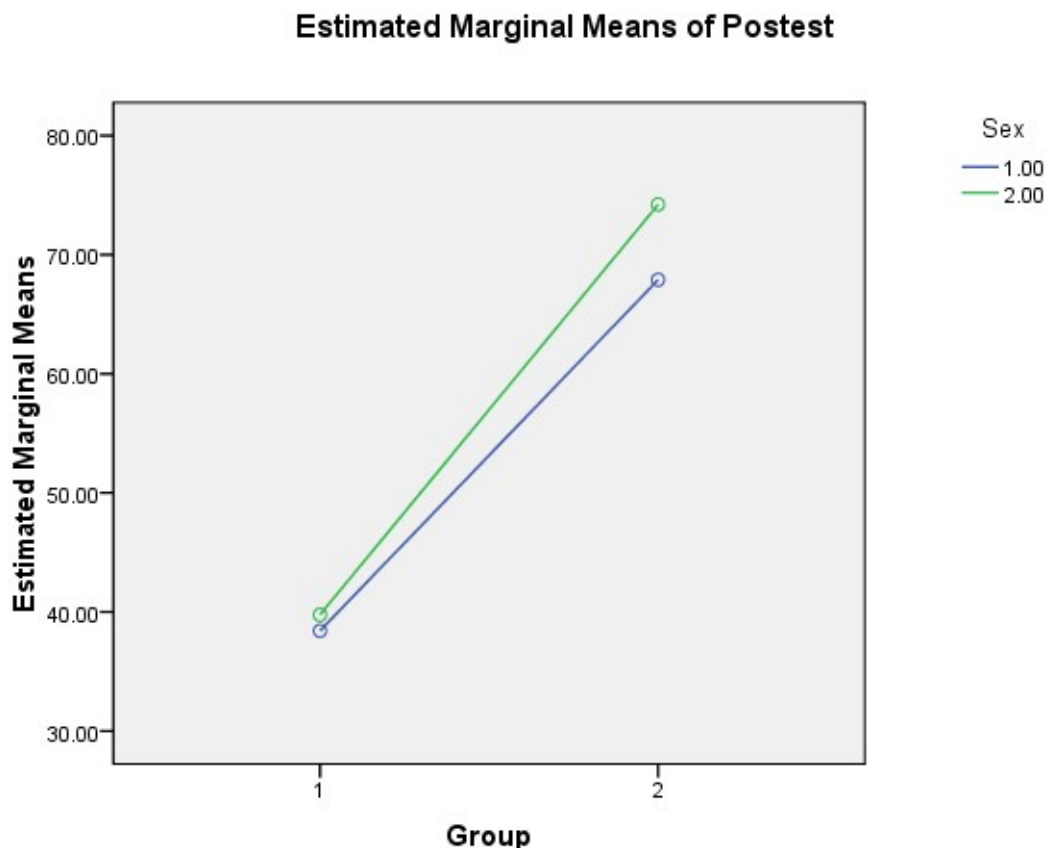
With regards to the experimental group (treatment) that represents Animation Teaching Strategy, female ($\bar{x}$= 73.57) performed better than the male ($\bar{x}$= 67.48) in CCAT after exposure to treatment, while a mean difference of 6.09 was observed between male and female of the experimental group. With regard to the graph shown in figure 8, the difference in mean achievement of male and female students in the experimental group interact at an estimated point of 35.0 downwards. At point 40 upward, there was no interaction between male and female. Therefore, there is an ordinal interaction. This implies that treatment and gender combined to produce a mutual effect on students' achievement in climate change with female benefiting more than male when taught with ATS.

Testing of Hypotheses

Research Hypothesis One (H_01): There is no significant difference in the mean achievement scores of students taught with animation teaching strategy and those taught with CTM.

Table 5: Two Way Analysis of Covariance (ANCOVA) Results on Climate Change Achievement Test (CCAT) of the Control and Experimental Groups in Pre and Post Tests.

Source	Type III Sum of Squares	df	Mean Square	F	Sig. (P)	Partial Eta Squared
Corrected Model	37556.012[a]	4	9389.003	37.095	.000	.504
Intercept	57259.664	1	57259.664	226.225	.000	.608
Pretest	493.533	1	493.533	1.950	.165	.013
Animation	35676.952	1	35676.952	140.955	.000	.491
Gender	547.897	1	547.897	2.165	.143	.015
Teaching Method* Gender	227.850	1	227.850	.900	.344	.006
Error	36953.962	146	253.109			
Total	515042.000	151				
Corrected Total	74509.974	150				

a.   R Squared = .504 (Adjusted R Squared = .490)

b.   Computed using alpha = .05

Table 5 shows two ways Analysis of covariance (ANCOVA) results on CCAT of the control and experimental groups in Pretest and Posttest. The F (150) =140.955, where p-value = 0.000 is less than 0.05 level of significance. Therefore, the null hypothesis which states that there is no significant difference in the mean achievement scores of students taught with animation teaching strategy and those taught with CTM was rejected. The result revealed that there was a significant difference in the achievement in favour of the experimental group.

Research Hypothesis Two (H₀2): There is no significant difference in the mean achievement scores of male and female students taught with animation strategy.

Table 5 shows a two-way analysis of covariance (ANCOVA) results of the difference in achievement of male and female students in experimental group refers. The F (0.900), with p-value of 0.344 is greater than 0.05 level of significance; therefore, the null hypothesis which states that there is no significant difference on the mean achievement scores of male and female students taught Climate change using ATS was accepted. It can therefore, be concluded that there is no statistically significant difference on the mean achievement scores of male and female students taught Climate change using ATS.

Research Hypothesis Two (H₀3): There is no interaction effect of animation teaching strategy and gender on students' mean achievement scores in climate change.

Table 5 shows the two-way analysis of covariance (ANCOVA) results of the difference in achievement of male and female students in experimental and control group. The F (0.900), with p-value of 0.344, is greater than 0.05 level of significance. Therefore, the null hypothesis which states that there is no interaction effect of animation teaching strategy and gender on students' mean achievement scores in climate change is not statistically significant and thus, stands accepted.

Discussion of Findings

The results of the descriptive statistics indicated that the experimental group gained higher mean scores on ATS than the control group. The discoveries of the study uncovered that animation

teaching was viable in upgrading students' achievement in climate change. The utilization of animation teaching enable students acquire more extravagant learning experience than they had when they were taught conventional method. The difference in the mean gained between the pretest and the posttest ATS mean scores of the students in the control and experimental group were 2.0 and 6.09 respectively. This signifies that students that were exposed to ATS improved better than their counterparts who were not exposed to ATS treatment. The ANCOVA results showed that there was a significant difference in the mean scores of ATS on students exposed to the treatment and those not exposed to the treatment. Thus, the students exposed to the treatment improvement were significant in favour of the ATS. This is an indication that using animation teaching strategy for teaching and learning does not only make students active but encourages higher cognition and a positive attitude among the students. Thus, the improvement corresponds with the positions of Daşdemir (2013) who stated that animation teaching should be used to teach science and environmental related concepts for easy assimilation of learners. Likewise, Çelik and Gündoğdu (2020) suggested that teachers should deliver animation based lessons, give animation preparation homework to students for a better and higher academic achievement. It was further stated that students taught with the Animation teaching strategy had higher academic achievement than those taught with the conventional approach. The implementation of ATS gives the students opportunity to learn from things around them.

The study has shown that ATS can enhance senior secondary school students' achievement, retention and attitude to climate change based on gender. Again, it also shows no gender bias on achievement, retention and attitude to climate change when taught with ATS. The approach is also a paradigm shift from teacher centered approach to learners' centered pedagogy and have been found to encourage the culture of continuous improvement. The findings of the study partially agrees with Mukagihana, Nsanganwimana and Aurah (2021) and Nkiru and Samuel (2017) that noted that male students scored higher than the female when exposed to animation teaching strategy.

Conclusion, Implication of the Study

The findings of this study confirmed that animation teaching strategy (ATS) is effective in enhancing secondary school students' achievement in climate change. Firstly, one major contribution of this study to knowledge is that, the result of the study have provided empirical evidence that ATS is an effective online teaching method that can also be used in a face-to-face classroom which enhances science students' academic achievement. However, the conventional teaching method (CTM) should not be completely criticized as ineffective because of the individuality of the students. Even though most students performed better academically when exposed to the ATS than the CTM, few students still performed better when exposed to the latter. Also, it was revealed that gender had no interaction effect on students' academic achievement when exposed to ATS and CTM. Secondly, this study also found out that ATS is not a gender bias teaching method, and can therefore be used to teach both male and female students, as well as single gender schools and co-educational schools to enhance students' achievement in the learning of climate change and other science and environmental education concepts.

Recommendations

Consequent upon the findings of the study and conclusions reached, the following recommendations were postulated:

  i.   Animation teaching strategy should be adopted in teaching and learning of climate change and other environmental education related concepts in Nigerian secondary schools.

ii. Government agencies saddled with responsibilities of planning and implementing curriculum and syllabi should explore and encapsulate this innovative ICT multimedia inclined strategy (animation teaching strategy) to prepare curriculums and syllabi that will enhance Nigerian students' achievement in climate change.

iii. Government should address the problem of erratic power supply in schools for effective ICT multimedia teaching such as animation to be possible.

iv. Schools should be provided with ICT gadgets such as computers, storage devices and projectors.

v. Incentives and financial motivations ought to be given to teachers by the government and other educational stakeholders to enable them acquire personal computers (PCs) for use in the planning and development of lessons that fosters animation teaching strategy.

vi. Science and Geography teachers should use animation teaching strategy to enhance students' achievement, retention and modification of attitudes towards conservation and sustainable development of environmental resources.

vii. Curriculum planners, textbook and journal article publishers and other stakeholders should integrate the effective use of animation so as to enhance students' and the general public's intellectual, cognitive, affective and psychomotor capabilities towards the conservation, preservation, and protection of our biophysical environment.

viii. Authors and Publishers of Science and Geography textbooks should include animated diagrams in their textbooks for easy cognitive retention and assimilation of the teaching and learning process.

ix. Workshops, conferences, and seminars should be organized to sensitize science teachers on the need to adopt and apply animation teaching strategy for teaching and learning of climate change and other environmental education topics infused in science and social science subjects in the Nigerian secondary schools.

Acknowledgement

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